

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPLICATION FOR U.S. LETTERS PATENT**

TITLE:

MICROFIBER MOP HEAD

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MICROFIBER STRING MOP

BACKGROUND OF THE INVENTION

Field of the Invention

[001] The present invention relates to improved string and strip mop heads and method of making the same. More particularly, string and strip mop heads using microfiber filaments, and method of making the same.

[002] Microfiber is comprised of a variation of polyester with extremely fine fiber filaments as compared to conventional fiber forms giving them their unique and highly desirable characteristics. The accepted terminology for qualification to be called a microfiber is generally linked to the fiber's weight, length, diameter and denier. To be a microfiber, the fiber must be less than 1 denier. As a comparison, microfiber filaments are half the diameter of a silk fiber, only one-third the diameter of a cotton fiber, and one hundred times finer than a human hair.

[003] A denier is a measurement of fiber weight used to express the yield, or thickness, of a thread or yarn. Higher denier means larger fibers and stronger material; smaller denier means finer fibers and lesser yield. One denier = 1 gram per 9,000 meters (about 5 miles).

[004] Split microfiber, is a microfiber that has been treated or processed to split the fiber into wedge-shaped segments which emanate from the fiber's central axis. Split microfibers have greater cleaning and absorption capabilities over non-split microfibers due to the increased surface area created when the fiber is split. The increased surface area provides for great absorption of fluids, the ability to remove particles from a surface that are smaller in diameter than the fiber, and better cleaning by a scraping action that is performed as the wedge-shaped segments are moved across a surface.

Description of the Prior Art

[005] Typically, string mops are comprised of a plurality of cords or strings of substantially equal lengths and disposed side-by-side in a layer of a number of thickness to form a sort of a strip made up of the cords. Traditionally, a tape or band can be stitched to the cords transversely across the cords somewhere between the two end points of the cords to securely hold the cords against spreading from one another. A string mop of this type is described in U.S. Patent 2,153,023. A string mop head is typically, attached to the end of an elongated handle to form a complete mop comprising the string mop head. There are various means present in the art for facilitating the clamping of the mop head to a handle.

[006] Presently, string mop heads are being constructed from strands of non-mircofiber filaments greater. Heretofore, there has not been any development in the industry to provide a string mop which makes use microfiber or more particularly split microfiber.

[007] It is known, however, to use microfiber in the construction of textile mop heads, such as pocket mop heads or pad mop heads. Mop heads of this type are manufactured with textile cloth which has been woven or weaved with microfiber filaments. Such mop heads are described in U.S. Patents 6,253,408 and 6,258,455. U.S. patent 5,935,883 describes a nonwoven web comprised of microfiber which may be used in the manufacturing of mop heads.

[008] It is noted in the U.S. Patent '455 to Clarke, that the use of microfiber textiles over textiles made of natural fibers such as cotton or wool, or blends of such natural fiber with nylon, rayon, polyester, and the like have several drawbacks when used for cleaning purposes. For example, fibers contained in such non-microfiber textiles are relatively large and are incapable of effective removal of particles and microbes which are smaller than the fibers of the cloth. As such, the U.S. Patent '455 to Clarke seeks to improve upon a mop head manufactured with such cloths by utilizing a textile material made of microfiber. However, this patent makes no provisions for a string mop head made of microfiber.

[009] An additional patent of interest is U.S. Patent 6,131,233 to Bolton et al. which discloses a mop head comprised of a plurality of tubular members having microfiber cloth secured to the outer surfaces of the tubular members. The main objective of this patent is to provide for a mop head with enhanced cleaning ability in small areas or on unusually shaped surfaces. However, the patent does not describe a string mop made of a plurality of microfiber cords.

[010] While the above-described devices fulfill their respective, particular objectives and requirements, the aforementioned patents do not describe a string mop head comprised of a plurality of microfiber cords or a method of manufacturing such a mop. Therefore, a need exists for a new and improved microfiber string mop head that can be used for effectively cleaning a surface by removing small particles and microbes from the surface. In this regard, the present invention substantially fulfills this need. In this respect, the string mop according to the present invention substantially departs from the conventional concepts and designs of the prior art, and in doing so provides an apparatus primarily developed for the purpose of effectively cleaning a surface by removing small particles and microbes from the surface.

SUMMARY OF THE INVENTION

[011] In view of the foregoing disadvantages inherent in the known types of mop heads now present in the prior art, the present invention provides an improved string mop head, and overcomes the above-mentioned disadvantages and drawbacks of the prior art. As such, the general purpose of the present invention, which will be described subsequently in greater detail, is to provide a new and improved string mop head and method which has all the advantages of the prior art mentioned heretofore and many novel features that result in a string mop head which is not anticipated, rendered obvious, suggested, or even implied by the prior art, either alone or in any combination thereof.

[012] Microfiber filaments have been manufactured using extrusion or spinning processes to produce a continuous monofilament product. The filament may be mechanically or chemically post-processed to provide a filament with desirable characteristics. The filament is then either knitted or weaved into textile sheets for use in manufacturing other products, such as mop heads. In the present invention, the monofilaments are not knitted or weaved to create a textile product to produce the mop head. Rather, at least two monofilaments of a desired length are twisted to form a cord. A plurality of these cords are then used to manufacture cleaning products, such as a string mop head. As such, the present invention provides an improved string mop head and method of making an improved string mop head using raw microfiber filaments.

[013] To attain this, one embodiment of the present invention comprises at least two fiber filaments twisted together to create a cord, the fibers may be twisted together by any known method. Preferably, the filaments can be between about 0.02 denier and about 0.99 denier. The filaments are spun extruded. A filament can be either split as described below or unsplit. A split filament comprises a core member, a plurality of projections emanating from the core member, and a wedge-shaped insert disposed between every other projection, wherein at least two filaments are intertwined to produce a cord for string mop head. Alternatively, the filaments can be non-split or round in configuration. The non-split filaments are less than one denier, preferably between about 0.02 denier and about 0.99 denier.

[014] The cords may be created by twisting from about 2 to about 50,000 filaments, from about 2 to about 1,250,000 filaments, from about 1,000 to about 25,000 filaments, or preferably from about 2,000 to about 50,000 filaments. At least one of the filaments is less than 1 denier, preferably from about 0.02 denier to about 0.99 denier. The cords may be created by twisting at least two filaments together to form a cord having from about 1,000 to about 25,000 denier.

[015] At least one filament may be a polyester material or a nylon material. Preferably, at least one filament is a combination of a polyester material and a nylon material. More

preferably, the filament may be extruded from about 70% to about 90% polyester material and about 10% to about 30% nylon material.

[016] Bundling at least two cords together forms a mop head. The cords may be individually looped and secured together in a bundle at their free ends or looped ends or alternatively the looped end of the cords may be secured to a surface, such as cloth or other durable material to make a mop head. The looped cords may also be secured to an outer surface of a glove to create a cleaning mitt. The cords may be secured to any surface which causes the cords to provide a cleaning action. Once such example, the cords may be attached to a typical revolving disc used in present automated car washes.

[017] The cords may be coated, impregnated or otherwise treated with an antibacterial solution, a fungicide, a cleaning solution, a deodorant, a perfume or coloring agent.

[018] In an additional embodiment, a strip mop head is constructed from microfiber textile sheets that are cut into strips using ultrasonic, heat or laser cutting techniques, thereby preventing the strips from unraveling. The strips are then either bundled together or individually sewn onto the surface of another sheet to form a mop head. In current practice, microfiber textile sheets are cut and sewn to create towels, cloths or flat mop heads. The second embodiment of the present invention seeks to improve the cleaning and absorption ability of mop head manufactured using microfiber textile sheets by providing a mop head comprised of a plurality of strips of microfiber sheet material opposed to a mop head comprising a single, fixed sheet of material.

[019] Current mop heads that utilize textile sheet material in a flat mop type design are limited to the available surface area for cleaning by the overall size of the mop head. Therefore, to increase the usable surface area, the size of the mop head must also be increased. In doing so, the increased mop head size prevents the mop head from being maneuvered into tight places and efficiently maneuvered around stationary objects.

[020] The strip mop head of the present invention has superior cleaning abilities in view of the prior art by providing a mop head having increased useable surface area and a mop head cable of cleaning around stationary objects and into tight places.

[021] In doing so, the strip mop head comprises a least two strips of material either bundled together, individually sewn to the surface of another sheet or attached to any surface which provides for creating a cleaning action with the strips. Once such example, the strips may be attached to a typical revolving disc used in present automated car washes.

[022] Ideally, the strips are cut to have a width from about 0.10 cm to about 30 cm and a length up to about 100 meters. The strips are cut from textile sheets manufactured using filaments which are less than 1 denier. Preferable the filaments used to manufacture the textile sheets are between about 0.02 and 0.99 denier.

[023] Preferably, the filaments are spun extruded, and a filament can be either split as described below or unsplit. A split filament comprises a core member, a plurality of projections emanating from the core member, and a wedge-shaped insert disposed between every other projection, wherein the filaments are woven into a sheet from which the strips are cut from. Alternatively, the filaments can be non-split or round in configuration. The non-split filaments are less than one denier, preferably between about 0.02 denier and about 0.99 denier.

[024] At least one filament may be a polyester material or a nylon material. Preferably, at least one filament is a combination of a polyester material and a nylon material. More preferably, the filament may be extruded from about 70% to about 90% polyester material and about 10% to about 30% nylon material.

[025] The strips may be coated, impregnated or otherwise treated with an antibacterial solution, a fungicide, a cleaning solution, a deodorant, a perfume or coloring agent.

[026] There has thus been outlined, rather broadly, the more important features of the invention in order that the detailed description thereof that follows may be better understood and in order that the present contribution to the art may be better appreciated.

[027] Numerous objects, features and advantages of the present invention will be readily apparent to those of ordinary skill in the art upon a reading of the following detailed description of presently preferred, but nonetheless illustrative, embodiments of the present invention when taken in conjunction with the accompanying drawings. In this respect, before explaining the current embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of descriptions and should not be regarded as limiting.

[028] As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

[029] It is therefore an object of the present invention to provide a new and improved microfiber mop head that has all of the advantages of the prior art mop heads and none of the disadvantages.

[030] It is another object of the present invention to provide a new and improved microfiber mop head that may be easily and efficiently manufactured using existing manufacturing processes.

- [031] An even further object of the present invention is to provide a new and improved microfiber mop head that has a low cost of manufacture with regard to both materials and labor, and which accordingly is then susceptible of low prices of sale to the consuming public, thereby making such microfiber mop head economically available to the buying public.
- [032] Even still another object of the present invention is to provide a microfiber mop having superior absorbent abilities.
- [033] Even still a further object of the present invention is to provide a new and improved microfiber mop head that has superior cleaning abilities.
- [034] Lastly, it is an object of the present invention to provide a new and improved method of manufacturing a microfiber mop head.
- [035] These together with other objects of the invention, along with the various features of novelty that characterize the invention, are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

- [036] The invention will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:
- [037] Figure 1 is a perspective view of one embodiment of the microfiber mop head constructed in accordance with the principles of the present invention.

[038] Figure 2 is a sectional end view of a microfiber filament of the microfiber mop head of the present invention.

[039] Figure 3 is a side elevation view of the microfiber mop head of the present invention.

[040] Figure 4 is a perspective view of an alternate embodiment of the microfiber mop head of the present invention.

[041] The same reference numerals refer to the same parts throughout the various figures.

DETAILED DESCRIPTION OF THE INVENTION

[042] Referring now to the drawings, and particularly to FIGS. 1-2, a preferred embodiment of the improved mop head of the present invention is shown and generally designated by the reference numeral 10.

[043] In Figure 1, a new and improved string mop head 10 of the present invention for providing effective cleaning with greater absorption and debris removal characteristics is illustrated and will be described. More particularly, the microfiber mop head 10 has a plurality of individual cords 12 arranged side-by-side and generally parallel to one another, thereby defining at least one layer of cords having a first end 14 and a second end 16. As illustrated, the mop head 10 includes two layers of cords, it is important to note that any number of layers of cords may be employed in the present invention. A cord-coupling element 18, indicated by broken line, is secured to the cords at one end, for example 14, to retain the ends of the cords together. The cord coupling element 18 as illustrated is a typical cloth band used in manufacturing mop heads, which is stitched across the ends of the cords and is used in the industry to connect the end of an elongated cylindrical handle to the mop head by a clamp. It is very important to note that this type of coupling element is illustrated

only for exemplary purposes and that any mop head to mop handle coupling element available in the industry may be employed in place thereof.

[044] The cords 12 can be looped with their free ends 20 secured to the coupling element 18 or the looped end 22 of the cords can be secured to the coupling element 18. In addition, the cords 12 may not be looped and have one free end secured to the coupling element 18. The cords 12 can be secured to the coupling element 18 by stitching, or through the use of an adhesive or through any other suitable method.

[045] The mop head 10, can have at least 2 cords 12 arranged side-by-side or from 2 to about 1000 cords arranged side-by-side, from 2 to about 500 cords arranged side-by-side, or preferably from about 50 to about 250 cords arranged side-by-side. The mop head 10 can have at least 1 layer of cords, from about 2 to about 10 layers of cords or from about 2 to about 1,000 layers of cords.

[046] The cords 12 are constructed by intertwining or twisting at least two filaments 100 together to form a completed cord by any known method. At least one of the filaments 100 is less than 1 denier. Preferably, at least one filament is from about 0.02 denier to about 0.99 denier. The filaments 100 are spun extruded and can be either split as described below or unsplit. Referring to Figure 2, a split filament 100 comprises a core member 102, a plurality of projections 104 emanating from the core member, and a wedge-shaped insert 106 disposed between every other projection, wherein at least two filaments are intertwined to produce a cord 12 for the mop head 10. Alternatively, the filaments 100 can be non-split or round in configuration. The non-split filaments are less than one denier, preferably between about 0.02 denier and about 0.99 denier.

[047] The cords 12 can be formed by twisting or intertwining from about 2 to about 50,000 filaments 100, from about 2 to about 1,250,000 filaments, from about 1,000 to about 25,000 filaments, or preferably from about 2,000 to about 50,000 filaments. At least one of the filaments 100 is less than 1 denier, preferably from about 0.02 denier to about 0.99 denier.

The cords 12 can be created by twisting at least two filaments 100 together to form a cord having from about 1,000 to about 25,000 denier.

[048] At least one filament 100 can be a polyester material or a nylon material. Preferably, at least one filament 100 is a combination of a polyester material and a nylon material. More preferably, the filament 100 is spun extruded from about 70% to about 90% polyester material and about 10% to about 30% nylon material.

[049] Bundling at least two cords 12 together forms a mop head 10. The cords 12 can be individually looped to form a looped end 22 and secured together in a bundle at their free ends 20 or alternatively the looped end of the cords may be secured to a surface, such as cloth or other durable material to make a mop head. The cords 12 having looped ends 22 may also be secured to an outer surface of a glove to create a cleaning mitt. The cords 12 can be secured to any surface which causes the cords to provide a cleaning action. Once such example is, the cords 12 can be attached to a typical revolving disc used in current automated car washes.

[050] Turning to Figure 3, which illustrates one alternate method of securing the cords 12 includes a surface 28, such as a durable cloth material, to which the cords are secured to by stitching 30. In this example, the looped end 22 of the cords 12 are secured to the surface 28; however, it is possible to secure the free ends 20 to the surface as well. The surface 28, for example, may represent the outer surface of a glove or mitt.

[051] In an additional embodiment, the cords 12 may be coated, impregnated or otherwise treated with an antibacterial solution, a fungicide, a cleaning solution, a deodorant, a perfume or coloring agent.

[052] Turning to Figure 4, an additional embodiment of the mop head 10 is illustrated and will be describe. More particularly, the mop head 10 includes strips 40 arranged side-by-side and generally parallel to on another defining at least one layer of strips having a first end 42

and a second end 44. As illustrated, the mop head 10 includes four layers of strips 40, it is important to note that any number of layers of strips may be employed in the present invention. A strip-coupling element 46, indicated by broken line, is secured to the strips at one end, for example 42, to retain the ends of the strips together. The strip coupling element 46 as illustrated is a typical cloth band used in manufacturing mop heads, which is stitched across the ends of the strips and is used in the industry to connect the end of an elongated cylindrical handle to the mop head by a clamp. It is very important to note that this type of coupling element is illustrated only for exemplary purposes and that any mop head to mop handle coupling element available in the industry may be employed in place thereof.

[053] The a strips 40 are cut from microfiber textile sheets using ultrasonic, heat or laser cutting techniques, thereby preventing the strips from unraveling. The strips 40 are then either bundled together or individually sewn onto the surface of another sheet to form a mop head.

[054] Ideally, the strips 40 are cut to have a width from about 0.10 cm to about 30 cm and a length up to about 100 meters. The strips 40 are cut from textile sheets manufactured using filaments which are less than 1 denier. Preferable the filaments used to manufacture the textile sheets are between about 0.02 and 0.99 denier.

[055] Referring to Figure 2, preferably, the filaments 100 are spun extruded, and a filament can be either split as described below or unsplit. A split filament 100 comprises a core member 102, a plurality of projections 104 emanating from the core member, and a wedge-shaped insert 106 disposed between every other projection, , wherein the filaments are woven into a sheet from which the strips are cut from.. Alternatively, the filaments 100 can be non-split or round in configuration. The non-split filaments are less than one denier, preferably between about 0.02 denier and about 0.99 denier.

[056] At least one filament 100 can be a polyester material or a nylon material. Preferably, at least one filament 100 is a combination of a polyester material and a nylon material. More

preferably, the filament 100 can be extruded from about 70% to about 90% polyester material and about 10% to about 30% nylon material.

[057] Bundling at least two strips 40 together forms a mop head 10. The strips 40 can also be secured to an outer surface of a glove to create a cleaning mitt. The strips 40 can be secured to any surface which causes the strips to provide a cleaning action. Once such example is, the strips 40 can be attached to a typical revolving disc used in current automated car washes.

[058] In an additional embodiment, the strips 40 may be coated, impregnated or other wise treated with an antibacterial solution, a fungicide, a cleaning solution, a deoderant, a perfume or coloring agent.

[059] Another aspect of the invention features a method of making a cord 12 for using in manufacturing a mop head 10 by spin-extruding a precursor material to form a precursor filament, acid treating the precursor filament to form a filament 100, wherein the filament is split to comprise a core member 102, a plurality of projections 104 emanating from the core member, and a wedge-shaped insert 106 disposed between every other projection, and weaving at least two continuous filaments together into a bundle to form the cord. Alternatively, a filament is spun-extruded from a precursor material to form a precursor filament, acid treating the precursor filament to form a filament, wherein the filament is not split. The filaments, either split or non-split are then woven or twisted into a bundle to form the cord. Preferably, a plurality of bundles are woven together to form the cord. Any weave comprehensible by one of skill in the art may be used to make the cords from the filaments described herein. More preferably, the cords described in the methods of the application may be comprised of about 2 to about 1,250,000 filaments. The filaments being less than 1 denier or from about 0.02 denier to about 0.99 denier. The cord made by this method may be about 1,000 to about 25,000 deniers, preferably about 10,000 to about 25,000 deniers. In addition, the cords or filaments may be impregnated or other wise treated with an antibacterial solution, a fungicide, a cleaning solution, a deoderant, a perfume or coloring agent.

[060] While preferred embodiments of the mop head has been described in detail, it should be apparent that modifications and variations thereto are possible, all of which fall within the true spirit and scope of the invention. With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

[061] Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.